



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
-----------------	-------------	----------------------	---------------------	------------------

10/615,394

07/09/2003

Jun Inoue

023312-0106

8482

22428

7590

08/18/2006

FOLEY AND LARDNER LLP
SUITE 500
3000 K STREET NW
WASHINGTON, DC 20007

EXAMINER

SINGH, DALZID E

ART UNIT

PAPER NUMBER

2613

DATE MAILED: 08/18/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/615,394

Applicant(s)

INOUE ET AL.

Examiner

Dalzd Singh

Art Unit

2613

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 09 July 2003.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-21 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-6, 10-18 and 21 is/are rejected.
- 7) ☒ Claim(s) 7-9, 19 and 20 is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date _____.
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____.

DETAILED ACTION

Drawings

1. The drawings are objected to because the structural elements of figure 1 (4 and 5), figure 2 (15-18) and figure 3 (97-102) are merely labeled with identifying numbers. Applicant must supply a suitable legend. A proposed drawing correction or corrected drawings are required in reply to the Office action to avoid abandonment of the application (see 37 CFR 1.84(n) and 1.84(o)). The following are quotation of 37 CFR 1.84(n) and 1.84(o):

(n) *Symbols*. Graphical drawing symbols may be used for conventional elements when appropriate. The elements for which such symbols and labeled representations are used must be adequately identified in the specification. Known devices should be illustrated by symbols which have a universally recognized conventional meaning and are generally accepted in the art. **Other symbols which are not universally recognized may be used, subject to approval by the Office, if they are not likely to be confused with existing conventional symbols, and if they are readily identifiable.**

(o) *Legends*. Suitable descriptive legends may be used subject to approval by the Office, or may be required by the examiner where necessary for understanding of the drawing. They should contain as few words as possible.

The objection to the drawings will not be held in abeyance.

Claim Rejections - 35 USC § 112

2. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

3. Claims 1-20 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claims 1 and 11 recites, "multiplexing formatted optical signal" It is unclear how the signal is being multiplexing formatted.

Claim 6 recite, "at least one SOA comprises two or more SOAs" It is unclear what is meant by one SOA comprises two or more SOAs.

Claim Rejections - 35 USC § 102

4. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

5. Claims 1 and 2 are rejected under 35 U.S.C. 102(e) as being anticipated by Miyazaki (US Pub. No. 2004/0109691).

Regarding claim 1 (as far as understood in view of the 112 2nd paragraph), Miyazaki discloses an optical signal transmission device for transmitting phase information of optical signals comprising:

a multiplexing formatted optical signal generator arranged to generate multiplexing formatted optical signals (see paragraph [0085], Miyazaki discloses OTDM signal which is optical multiplexed signal); and

an optical phase generator arranged to receive the multiplexing formatted optical signals (shown in Fig. 4, phase regulating circuit (150) receives the multiplexing signal).

Regarding 2, as discussed above, Miyazaki discloses that the bit rate of the multiplexing formatted optical signals is 160 Gbits/s which is at least 80 Gbit/s.

6. Claims 1, 3 and 21 are rejected under 35 U.S.C. 102(e) as being anticipated by Fu et al (US Pub. No. 2003/0223462).

Regarding claim 1 (as far as understood in view of the 112 2nd paragraph), Fu et al discloses an optical signal transmission device for transmitting phase information of optical signals comprising:

a multiplexing formatted optical signal generator arranged to generate multiplexing formatted optical signals (see paragraph [0043], Fu et al discloses OTDM signal which is optical multiplexed signal); and

an optical phase generator arranged to receive the multiplexing formatted optical signals (shown in Fig. 3, phase shifter (180) receives the multiplexing signal).

Regarding claim 3, as shown in Fig. 3, the multiplexing formatted optical signal generator comprises an optical time division multiplexing (OTDM) carrier suppressed-return to zero (CS-RZ) signal generator arranged to generate OTDM-CS-RZ signals comprising signal light (see paragraph [0043]); and wherein the optical phase generator comprises an optical phase conjugator arranged to receive the OTDM-CS-RZ

signals from the OTDM CS-RZ signal generator (Fig. 3 can be considered phase conjugator since the phase of the output bit signal is inversely related).

Regarding claim 21, Fu et al disclose an optical signal transmission device comprising:

an optical time division multiplexing (OTDM) carrier suppressed-return to zero (CS-RZ) signal generating means for generating OTDM-CS-RZ signals comprising signal light (see paragraph [0009]); and

an optical phase conjugating means for receiving the OTDM signals from the OTDM-CS-RZ signal generating means (Fig. 3 can be considered phase conjugator since the phase of the output bit signal is inversely related).

7. Claims 11, 13 and 15-18 are rejected under 35 U.S.C. 102(e) as being anticipated by Watanabe et al (US Pub. No. 2001/0021288).

Regarding claim 11 (as far as understood in view of the 112 2nd paragraph rejection), Watanabe et al disclose an optical information transmission method comprising:

receiving multiplexing formatted optical signals generated by a multiplexing formatted optical signal generator at an optical phase generator (see paragraphs [0025, 0030 and 0148], the optical system generates OTDM signal which is received by the phase generator found in the repeater system [0153-0155]); and

phase conjugating the multiplexing formatted optical signals by means of four wave mixing (FWM) (see paragraphs [0153-0155]; the nonlinear medium generates four-wave mixing of the optical signal; it is inherent that nonlinear devices makes use of four wave mixing (FWM) see also paragraph [0006] of applicant disclosure).

Regarding claim 13, as discussed above, the OTDM signal is received by the regenerator, therefore, it is inherent that the system transmits the multiplexing formatted optical signals through a first transmission route before the phase conjugating step; and transmitting the multiplexing formatted optical signals through a second transmission route after the phase conjugating step.

Regarding claim 15, as shown in Fig. 8, Watanabe et al show phase conjugating step further comprises:

- emitting continuous wave (CW) pump light (probe first light);
- arranging the phase of signal light of the multiplexing formatted optical signals (NOLM1 arranges phase of the signal light by Kerr effect);
- coupling the signal light having a conjugated phase and the pump light to provide coupled light (coupler 12 couples the light);
- performing a first amplification of the coupled light to provide first amplified light; and amplifying the first amplified light to provide phase conjugated light (power control may be optical amplifier which amplify the signal, see paragraph [0115]).

Regarding claim 16, as shown in Fig. 8, Watanabe et al show phase conjugating step further comprises filtering the phase conjugated light.

Regarding claim 17, as discussed above, Watanabe et al disclose the phase conjugating step further comprises: emitting continuous wave (CW) pump light (probe first light); arranging the phase of the signal light of the multiplexing formatted optical signals (NOLM arranges the phase by Kerr effect); and coupling the signal light having an arranged phase and the pump light to provide coupled light (coupler 12, couples the light).

Regarding claim 18, as discussed above, Watanabe et al disclose generating the multiplexing formatted optical signals using the multiplexing formatted optical signal generator.

Claim Rejections - 35 USC § 103

8. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

9. Claims 4 and 10 are rejected under 35 U.S.C. 103(a) as being unpatentable over Fu et al (US Pub. No. 2003/0223462).

Regarding claim 4, Fu et al disclose transmission of optical signal using transmission fiber and differ from the claimed invention in that Fu et al do not disclose the fiber is single mode fiber. However, examiner takes official notice that it is well known to transmit optical signal using standard single mode fiber (SSMF).

Regarding claim 10, Fu et al disclose transmission of optical signal using transmission fiber and differ from the claimed invention in that Fu et al do not disclose the fiber a first transmission route comprising standard single mode fiber (SSMF) between the multiplexing formatted optical signal generator and the optical phase generator; and a second transmission route arranged after the optical phase generator, wherein both the first transmission route and the second transmission route are longer than 100 km. However, examiner takes official notice that it is well known to transmit optical signal using standard single mode fiber (SSMF) and further it would have been obvious to an artisan of ordinary skill in the art to provide a desired length of fiber.

10. Claim 2 is rejected under 35 U.S.C. 103(a) as being unpatentable over Fu et al (US Pub. No. 2003/0223462) in view of Miyazaki (US Pub. No. 2004/0109691).

Regarding claim 2, Fu et al disclose transmission of 80 Gbits/s OTDM signal and differ from the claimed invention in that Fu et al do not disclose the rate of such signal to be at least 80 Gbit/s. Miyazaki teaches transmission of OTDM signal at the rate of 160 Gbit/s. Therefore, it would have been obvious to an artisan of ordinary skill in the art at the time the invention was made to transmit the OTDM signal at the rate of at least 80 Gbit/s.

11. Claims 5 and 6 are rejected under 35 U.S.C. 103(a) as being unpatentable over Fu et al (US Pub. No. 2003/0223462) in view prior art disclosed by applicant (discussed on paragraph [0006]).

Regarding claim 5, Fu et al disclose phase generator as discussed above and differ from the claimed invention in that Fu et al do not disclose that phase generator includes at least one semiconductor optical amplifier (SOA). However, it is well known to provide semiconductor amplifier at the phase generator. The prior arts teach the use of semiconductor optical amplifier at the phase generator. Therefore, it would have been obvious to an artisan of ordinary skill in the art at the time the invention was made to provide semiconductor optical amplifier as taught by the prior art to the system of Fu et al.

Regarding claim 6 (in view of the 112 2nd paragraph), as discussed above, it would have been obvious to provide at least one SOA comprises two or more SOAs.

12. Claims 12 and 14 are rejected under 35 U.S.C. 102(e) as being anticipated by Watanabe et al (US Pub. No. 2001/0021288) in view of Fu et al (US Pub. No. 2003/0223462).

Regarding claim 12, Watanabe et al disclose transmission of multiplexed OTDM signal and differ from the claimed invention in that Watanabe does not disclose that the multiplexing formatted optical signals comprise optical time division multiplexing carrier suppressed-return to zero (OTDM-CS-RZ) signals. Fu et al teach transmission of such

signal (see paragraph [0009]). Therefore, it would have been obvious to an artisan of ordinary skill in the art at the time the invention was made to transmit optical time division multiplexing carrier suppressed-return to zero (OTDM-CS-RZ) signals as taught by Fu et al to the transmission system of Watanabe et al. One of ordinary skill in the art would have been motivated to do this in order to improve quality of data stream of high bit rate.

Regarding claim 14, Watanabe et al disclose transmission of optical signal using transmission fiber and differ from the claimed invention in that Watanabe et al do not disclose that both the first transmission route and the second transmission route comprise standard single mode fiber (SSMF) with a length greater than 100 km. However, examiner takes official notice that it is well known to transmit optical signal using standard single mode fiber (SSMF) and further it would have been obvious to an artisan of ordinary skill in the art to provide a desired length of fiber.

Allowable Subject Matter

13. Claims 7-9 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

Conclusion

14. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. Watanabe (US Patent No. 6,504,972) is cited to show optical fiber communication system using optical phase conjugation as well as apparatus applicable to the system and method of producing the same.

Futami et al (US Pub. No. 2003/0002833) is cited to show method and device for measuring the waveform of an optical signal.

15. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Dalzid Singh whose telephone number is (571) 272-3029. The examiner can normally be reached on Mon-Fri 9am - 5pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Jason Chan can be reached on (571) 272-3022. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

DS

July 26, 2006

David Singh